

I CLAIM:

1. A method for training a computer-implemented classification system to be able to identify a handset used over a communication network, comprising:

(a) transforming training data for a plurality of handset types into a composite dataset including training feature vectors;

(b) configuring a plurality of classifiers based on said composite dataset, including:

(1) associating one of said classifiers with one of said handset types not previously associated with any other of said classifiers;

(2) training said classifier of (1) to recognize, within said composite dataset, (A) a first class of training feature vectors related to said associated handset type, and (B) a second class of training feature vectors related to other handset types;

(3) repeating (1) and (2) for at least another of said classifiers; and

(c) storing a result of (b) in a computer-readable memory so as to be usable to (i) correlate an unidentified handset's test feature vectors against said trained classifiers, (ii) select one of said classifiers exhibiting the greatest correlation, and (iii) determine said handset type associated with said selected classifier.

2. The method of claim 1, where said training data for at least one of said handset types is not obtained directly via said handset, but rather derived from training data obtained via another said handset using an acoustic model of said another handset.

3. The method of claim 1, further comprising updating said audio training data using additional test data obtained upon attempting to use said plurality of said classifiers to identify said unidentified handset.

4. A method for identifying a handset used over a communication network, comprising:

(a) accessing a plurality of classifiers, each of which has been trained to recognize a handset type by differentiating between a plurality of feature vectors

associated with said handset type and a plurality of feature vectors associated with other handset types:

- (i) said feature vectors for each said handset having been derived by transforming audio training data obtained therefrom into a multi-dimensional domain;
- (b) obtaining test data from a handset to be identified;
- (c) transforming said test data into a plurality of test feature vectors in said multi-dimensional domain;
- (d) determining the degree of correlation between said test feature vectors and a first class of one of said classifiers;
- (e) repeating (d) for at least another of said classifiers; and
- (f) identifying said handset in (b) as being of said handset type associated with a classifier in (d) or (e) which exhibits the highest of said correlations.

5. The method of claim 4 further comprising updating training data based on test data obtained from said handset type in (b).

6. The method of claim 5 further comprising training a new classifier based on said obtained test data.

7. The method of claim 4, where (f) includes:

- (a) determining a plurality of correlations from which a single dominant positive correlation cannot be reliably determined;
- (b) determining said handset types associated with said correlations in (a); and
- (c) querying a user of said unidentified handset to confirm one of said handset types as being said unidentified handset type.

8. The method of claim 7 further comprising using an approximate handset model, in response to said user's inability to confirm one of said handset types.

9. A computer-implemented classification system for identifying a handset used over a communication network, comprising:

- (a) a composite database, including training feature vectors obtained by transforming training data for a plurality of handset types;
- (b) a plurality of classifiers that have been trained based on said composite database:
 - (i) each classifier associated with at least one handset type;
 - (ii) each classifier configured to recognize, within said composite database, (A) a first class of training feature vectors related to said associated handset type(s), and (B) a second class of training feature vectors related to other handset types;
- (c) said classifiers comprising a classification system configured to:
 - (i) correlate an unidentified handset's test feature vectors against said trained classifiers;
 - (ii) select one of said classifiers exhibiting the greatest correlation;and
 - (iii) determine said handset type associated with said selected classifier.

10. A method for identifying a handset used over a communication network, comprising:

- (a) obtaining audio training data for a plurality of handset types;
- (b) training each of a plurality of support vector machines to identify, respectively, at least one of said plurality of handset types;
- (c) receiving audio testing data for an unidentified handset;
- (d) determining the degree of recognition, of said audio testing data, by one of said plurality of support vector machines;
- (e) determining the degree of recognition of said audio testing data by at least another of said plurality of support vector machines; and
- (f) classifying said unidentified handset by determining the highest degree of recognition in (d) and (e).

11. The method of claim 10 where:

(b) includes training each of said support vector machines to identify a unique one of said handset types; and

(f) includes interrogating as many of said support vector machines as needed to classify said unidentified handset to a desired degree of accuracy.

12. The method of claim 10 where:

(b) includes training at least one support vector machine to identify a plurality of said handset types; and

(f) includes performing at least one round of a binary search process using said support vector machine trained to identify a plurality of handset types.

~~13.~~ A system for identifying a handset used over a communication network, comprising:

(a) a data storage configured to contain training data for a plurality of handset types;

(b) a plurality of support vector machines trained to identify, respectively, at least one of said plurality of handset types;

(c) an interface operable to receive audio testing data for an unidentified handset;

(d) each support vector machine configured to determine its degree of recognition of said audio testing data;

(e) a processor configured to identify said unidentified handset by determining the support vector machine exhibiting the highest degree of recognition in (d).

~~14.~~ A computer-readable medium for training a computer-implemented classification system to be able to identify a handset used over a communication network, comprising logic instructions that, if executed:

(a) transform training data for a plurality of handset types into a composite dataset including training feature vectors in a multi-dimensional domain;

(b) configure a plurality of classifiers based on said composite dataset, including:

(1) associate one of said classifiers with one of said handset types not previously associated with any other of said classifiers;

(2) train said classifier of said (1) to recognize, within said composite dataset, (A) a first class of training feature vectors related to said associated handset type, and (B) a second class of training feature vectors related to other handset types;

(3) repeat said (1) and (2) for at least another of said classifiers; and

(c) store a result of said (b) in a computer-readable memory so as to be usable to (i) correlate an unidentified handset's test feature vectors against said trained classifiers, (ii) select one of said classifiers exhibiting the greatest correlation, and (iii) determine said handset type associated with said selected classifier.

15. A computer-readable medium for identifying a handset used over a communication network, comprising logic instructions that, if executed:

(a) access a plurality of classifiers, each of which has been trained to recognize a handset type by differentiating between a plurality of feature vectors associated with said handset type and a plurality of feature vectors associated with other handset types:

(i) said feature vectors for each said handset having been derived by transforming audio training data obtained therefrom into a multi-dimensional domain;

(b) obtain test data from a handset to be identified;

(c) transform said test data into a plurality of test feature vectors in said multi-dimensional domain;

(d) determine the degree of correlation between said test feature vectors and a first class of one of said classifiers;

(e) repeat said (d) for at least another of said classifiers; and

(f) identify said handset in (b) as being of said handset type associated with a classifier in (d) or (e) which exhibits the highest of said correlations.

16. A computer-readable medium for identifying a handset used over a communication network, comprising:

- (a) logic code for obtaining audio training data for a plurality of handset types;
- (b) logic code for training each of a plurality of support vector machines to identify, respectively, at least one of said plurality of handset types;
- (c) logic code for receiving audio testing data for an unidentified handset;
- (d) logic code for determining the degree of recognition, of said audio testing data, by one of said plurality of support vector machines;
- (e) logic code for determining the degree of recognition of said audio testing data by at least another of said plurality of support vector machines; and
- (f) logic code for classifying said unidentified handset by determining the highest degree of recognition in said (d) and (e).

17. A computer-implemented classification system trained to be able to identify a handset used over a communication network, comprising:

- (a) means for transforming training data for a plurality of handset types into a composite dataset including training feature vectors in a multi-dimensional domain;
- (b) means for configuring a plurality of classifiers based on said composite dataset, including:
 - (1) means for associating one of said classifiers with one of said handset types not previously associated with any other of said classifiers;
 - (2) means for training said classifier of said (1) to recognize, within said composite dataset, (A) a first class of training feature vectors related to said associated handset type, and (B) a second class of training feature vectors related to other handset types;
 - (3) means for repeating said (1) and (2) for at least another of said classifiers; and
- (c) means for storing a result of said (b) in a computer-readable memory so as to be usable to (i) correlate an unidentified handset's test feature vectors against

said trained classifiers, (ii) select one of said classifiers exhibiting the greatest correlation, and (iii) determine said handset type associated with said selected classifier.

18. A system for identifying a handset used over a communication network, comprising:

(a) means for accessing a plurality of classifiers, each of which has been trained to recognize a handset type by differentiating between a plurality of feature vectors associated with said handset type and a plurality of feature vectors associated with other handset types:

(i) said feature vectors for each said handset having been derived by transforming audio training data obtained therefrom into a multi-dimensional domain;

(b) means for obtaining test data from a handset to be identified;

(c) means for transforming said test data into a plurality of test feature vectors in said multi-dimensional domain;

(d) means for determining the degree of correlation between said test feature vectors and a first class of one of said classifiers;

(e) means for repeating said (d) for at least another of said classifiers; and

(f) means for identifying said handset in (b) as being of said handset type associated with a classifier in (d) or (e) which exhibits the highest of said correlations.

19. A computer-implemented classification system for identifying a handset used over a communication network, comprising:

(a) a composite storage, said storage including training feature vectors obtained by transforming training data for a plurality of handset types;

(b) a plurality of classifiers that have been trained based on said composite storage means:

(i) each classifier associated with at least one handset type;

(ii) each classifier configured to recognize, within said composite storage means, (A) a first class of training feature vectors related to said associated

handset type(s), and (B) a second class of training feature vectors related to other handset types;

- (c) said classifiers comprising a classification system including:
 - (i) means for correlating an unidentified handset's test feature vectors against said trained classifiers;
 - (ii) means for selecting one of said classifiers exhibiting the greatest correlation; and
 - (iii) means for determining said handset type associated with said selected classifier.

~~20.~~ A system for identifying a handset used over a communication network, comprising:

- (a) means for obtaining audio training data for a plurality of handset types;
- (b) means for training each of a plurality of support vector machines to identify, respectively, at least one of said plurality of handset types;
- (c) means for receiving audio testing data for an unidentified handset;
- (d) means for determining the degree of recognition, of said audio testing data, by one of said plurality of support vector machines;
- (e) means for determining the degree of recognition of said audio testing data by at least another of said plurality of support vector machines; and
- (f) means for classifying said unidentified handset by determining the highest degree of recognition in said (d) and (e).

~~21.~~ A system for identifying a handset used over a communication network, comprising:

- (a) storage means for storing training data for a plurality of handset types;
- (b) a plurality of classifier means trained to identify, respectively, at least one of said plurality of handset types;
- (c) an interface means for receiving audio testing data for an unidentified handset type;
- (d) each classifier means configured to determine its degree of recognition of said audio testing data;

(e) a processor means for identifying said unidentified handset by determining the classifier means exhibiting the highest degree of recognition in (d).